Energy and Climate WG: Session II. Energy and Water in Climate Change Context **[1]**

Submitted by shkumar on Thu, 2012-10-11 09:58 Wednesday, January 9, 2013 - 15:30 to 17:00
Event: Winter Meeting 2013 [2]
Session Type: Breakout [3]
Expertise Level: Intermediate [4]
Collaboration Area: Air Quality [5]
Climate Education Working Group [6]
Decisions [7]
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Abstract/Agenda:
Agenda:

3:30-4:00 PM: NASA SERVIR: Project Highlights and Data/Decision Support Needs – Nancy Searby, NASA | link to presentation [12]

4:00-4:30 PM CUAHSI Hydrologic Information System and the Water-Energy Nexus - Richard Hooper, Consortium of Universities for the Advancement of Hydrologic Science, Inc. | link to presentation (part 1) [13] | link to presentation (part 2) [14]

4:30-5:00 PM Security Perspectives of Water Treaties and Water Resources Under Certain Climate Change Scenarios - Matt Zentner (DIA) | link to presentation [15]

Session Abstract:

This session focuses on Global energy and Water issues in the context of climate change with views from various government agencies. Specific topics from the national climate assessment will be addressed relating to climate change impact on water and energy - two deeply interrelated resources for sustainability and growth. Water shortage is already evident in many parts of the world, and there is a pant-up need for energy to support the population and economic growth. The competition for water for agriculture vs. energy has already become a major issue; both are needed and sustainability and security planners must contend with trade-offs. The challenges relating to the availability of water and energy to serve the needs of growing populations and continued worldwide economic growth are likely to be exacerbated by climate change in coming decades.

Presentations in this session will address some of these needs, tradeoffs, and projects being undertaken by various agencies. Our goal in ESIP is to compile data and information on the topic, and serve as a focal point for its members to have access to the relevant data to generate actionable information, and wherever possible facilitate a dialog for generating new information that cuts across agency boundaries and serves unmet needs. To that end, new project ideas will be discussed.

NASA SERVIR: Project Highlights and Data/Decision Support Needs
Nancy Searby, NASA

The SERVIR initiative integrates satellite observations, ground-based data and forecast models to monitor and forecast environmental changes and to improve response to natural disasters. SERVIR

enables scientists, educators, project managers and policy implementers to better respond to a range of issues including disaster management, agricultural development, biodiversity conservation and climate change. Principally supported by NASA and the US Agency of International Development, or USAID, a strong emphasis is placed on partnerships to fortify the availability of searchable and viewable earth observations, measurements, animations, and analysis. A SERVIR coordination office and rapid prototyping facility is located at the NASA Marshall Space Flight Center in Huntsville, Alabama. Regional SERVIR hubs are located at the Water Center for the Humid Tropics of Latin America and the Caribbean, or CATHALAC, in Panama and the Regional Center for Mapping of Resources for Development, or RCMRD, based in Kenya, and the International Center for Integrated Mountain Development, or ICIMOD, located in Kathmandu, Nepal.

CUAHSI Hydrologic Information System and the Water-Energy Nexus
Richard Hooper, Consortium of Universities for the Advancement of Hydrologic Science, Inc.

The Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) has developed a standards-based services-oriented architecture for *in situ* time-series data. This development has been accelerated by the recent adoption of WaterML2, the mark-up language for transmission of this data, as a standard. The World Meteorological Organization, a UN agency, has also initiated a process to evaluate WaterML2 as a standard for global data exchange and has encouraged the world's hydrologic services to test this language. WaterML2 contains an important extension to WaterML in that time series can be associated not only with a point (such as a stream gage) but also with arcs (such as a stream reach) and polygons (such as watersheds or political units).

These *in situ* data are a critical part of the information needed to evaluate the water-energy nexus, but only part of the picture. Dynamic, gridded data, such remotely sensed data including radar-based precipitation estimates, energy measurements, etc, are also important. These data are typically stored as netCDF files. WaterML services for these data have also been developed by John McEnery (UT Arlington) for radar precipitation estimates and by Bill Teng (NASA) for GLDAS data. WaterML services enable small areas to be studied through time far more conveniently than the netCDF format. Alternate approaches for transposing these netCDF data to be served as time series are also being evaluated.

Any study of the water-energy nexus will require water use data. This is likely the largest gap that is the most difficult one to fill. These are also time series data, but typically associated with a polygon, such as a county or land-use unit, rather than points. WaterML2 can transmit such data. As data products are developed, data providers should be encouraged to provide WaterML2 services for them.

Security Perspectives of Water Treaties and Water Resources Under Certain Climate Change Scenarios
Matt Zentner, DoD

Increased variability of rainfall and flow from climate change has the potential to stress existing transboundary water sharing agreements and make meeting the needs of all riparians difficult. Water treaties have been theorized as valuable tools for mitigating conflict in times of climate stress, but the relationship between the design of treaties and their impact has not been explored in depth. While treaties remain important to solving conflict over resources, water problems extend beyond just water, both shaped by and shaping political, military, and socio-cultural concerns.

Notes:
SERVIR

Nancy Searbin, Dan Irwin, Ashutosh Limaye

Partnership with USAID since early 2000s
Tagline Dan likes to use: Space to Village
NASA: study earth from space
USAID: harness USAs intellectual capital to solve problems in developing world

SERVIR began 2004, 3 hubs functioning, potential expansion plans
RCMRD, ICIMOD, CATHALAC
Competitive process going to open in southeast asia to be a hub

'south-south' collaboration
build capacity with a group to use data, and they can help each other

Capacity building: regional institutes, stakeholders, young professionals
Access to data, models, online maps
Co-develop decision tools

SERVIR thematic areas, this talk focused on climate and energy
Can find all work on SERVIRGlobal.net
3 objectives of USAID's development strategy
SERVIR contributes in 1 and 2 (reduce deforestation, help prepare for changes in climate)
USAID funds vulnerable countries physically impacted by CC, least developed countris, small islands and glacier-dependent areas

Global partnerships: UN, GEO, World Bank, etc. as well as region-specific in mesoamerica, east and south africa, hindu-kush Himalaya

Applied Sciences Team:
Have 11 new investigators to support new decision tools in 3 regions working in currently

Example: helped in analysis of watersheds and sediments to explain why hydrodams producing less power
Example: flood mapping in Africa
Example: Hiamalyan region, climate change effects on water resources and hydroelectric power plants, critical portion of GDP

Hydrologic modeling in east Africa. Employed CREST model for a watershed in Kenya, near real time
Kenya's electric utility interested in the model, usage expanding also training in other countries

Data challenges: formatting of data and being able to ingest it to models
Patterns and recipes for solved problems are being documented, will go on the web (SERVIRGlobal.net)
Some common characteristics falling out

Have other dissemination/collection approaches: texting
Kenya: everyone has a cell phone; fire and SMS service
Mobile apps (smart phones coming into use)
Wireless sensor network, paucity of ground data
ISS ISERV camera system, putting in window of space station, visible range -- pointing camera during smaller emergencies

How could ESIP help?
- relate work to GIS cluster-- serving data layers
- ISERV tech demo, if it works integrate with data centers to handle data properly
- How help end-users access earth observations from different areas?
- Help in reaching broader audience
- Understanding climate data
- Building data management skills at hubs

Dr. Richard Hooper
The CUAHSI Hydrologic Information System

Dealing with time series data: HIS
- provides web services, tools, standards and procedures that enhance access to more and better data
wasting time searching for and formatting data

Data: e.g. stream gauge
- in situ sensor data collected at fixed point over time
- can do moving platform less efficiently, and any type of property

The data have a similar structure, collected by many organizations
USA has a GIS data repository but no similar repository for water data (there is water quality portal now)

Data integration:
Create a digital watershed -- GIS, remote sensing, geochemical data, fixed point time series, geological structures, weather and climate dynamic grids
Building a Google for water data

Results:
WaterML langauge for water metadata
Global (north america-centric) catalog
Usage is growing

Catalog is the metadata not the data

HydroDesktop
- free, open source GIS
- select area of interest, can view data points and metadata
- can view and download, client converts units etc.

Gridded data as virtual Gages
NLDAS

ESIP could help propagate the use of standards -- waterML for water data, like we use netCDF
Has built-in analysis

Prototype of faceted searching with web-based client, platform independent

HydroServer goals: platform for publishing space-time datasets
- Excel is not working with sensors

HIS Central for publishers and users

Ontology
- closer to being just a controlled vocabulary
worked with EPA and USGS, ITIS and experts
Use a hierarchy: core concept, property, branch, leaf

Ultimately have created large-scale prototype for one kind of data
Moving Forward
- getting water data center, functional facility
3 year start-up period
Broader collaboration: OGC and WMO adopting WaterML
Towards an international standard

Foresee a client to interpret other data centers for hydrologists

Dr. Matt Zentner, Defense Intelligence Agency
Water Security

- More of a data consumer than a data provider in the intel community
Water security: national rather than human, influencing economy rather than individual livelihood
e.g. water wars, political behavior, regional security dynamics
- GDP growth and rainfall correlation in Ethiopia (not accounting for international aid)

National Intelligence Estimate (NIE)
2008 climate change NIA
4 paths to impact global climate change --> changes in water quality
NIE background: requested by department of state in context of water Security
- took 30 year standpoint, over 160 drafts

NIE bottom line: probably no direct wars, but will affect relationships

Academic research: asking similar questions
Oregon State databases on history of treaties, with ratings
World Bank interested because of investment decisions, changes in water resources affecting dam building

Worked together looking at treaties and did they have capacity to handle future change
- looked to past: how managed climate related fluctuations in the past 50 years? Then can project into future

Example: Indus Water Treaty (1960)
- positive history, but last couple of years additional pressures
- population stress, variable rainfall, Afghanistan developing, glaciers receding, increased dam projects
Recently arbitration has gone to mediators and court

Conclusions:
The strong treaties fomented dialogue, can appear as conflict in the news even if talking
Water problems extend beyond just water
Solutions are often static; problems are not

The NIE:
- risks: engineering solutions increasingly common
- accurate hydro data deficit in national security areas
- impact of climate change often not modeled
- integrated natural resource assessments would be useful

Actions:
Need webex for remote participation.

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Participants:
about 20-25 people.

Teaser: Discussion of global energy and water nexus in the context of climate change - data and actionable information.
Keywords: Energy [35]
water [36]
Climate Change [37]
Data access [38]
Actionable Information [39]

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